

Sanctuary Ecologically Significant Area (SESA)

SESA 13: Deep Sur Canyon

Description

SESA 13 includes deep section of Sur Canyon and the surrounding soft bottom slope 2 habitat. Though it includes a wide depth range (1,205-1,932 m), it has low habitat richness (2 habitats) and habitat diversity (index =2.0). Very little research has occurred in this SESA; one benthic ROV survey. Water upwelled at Point Sur is likely to be advected through this SESA. The water over this SESA has relatively low primary productivity and has low likelihood of being a krill hot spot and does not overlap with any known foraging hotspots. This SESA is located within MBNMS, and research activities may require a permit (http://montereybay.noaa.gov/resourcepro/permit/permits_need.html).

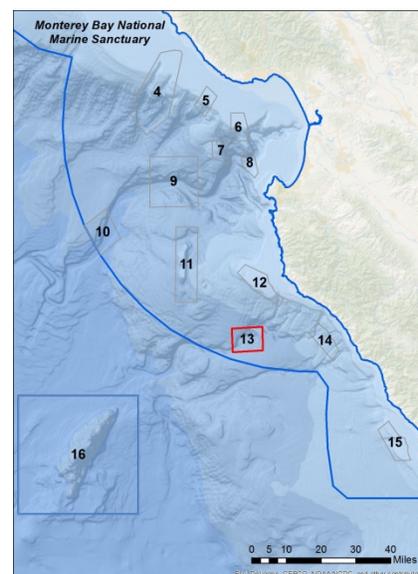


Figure 1. The location of SESA 13 and twelve additional SESAs in Monterey Bay National Marine Sanctuary. Credit: Chad King/MBNMS.

Resource Management Issues

SESA 13 boundaries contain unique habitats and communities of the deepest parts of Sur Canyon that need to be better described. Little biological characterization has been done within SESA 13.

- Essential Fish Habitat (EFH) Conservation Area
- Commercial shipping lane
- Recreational fishing
- Leatherback sea turtle critical habitat

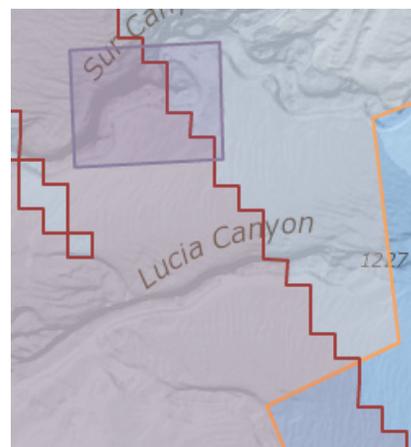


Figure 2. Close-up map of SESA 13. Grey border=SESA boundary; light orange border=EFH Conservation Area; red=dominant commercial shipping lane. Source: SESAs Interactive Map, <http://sanctuarymonitoring.org/maps/sesa/>.

Living Marine Resources & Uses

Table 1. Species known to occur within SESA 13: Deep Sur Canyon.

Invertebrates	-sponges† (Porifera), e.g., <i>Asbestopluma</i> sp., barrel-shaped, large boot, yellow vase -stony corals† (Scleractinia), e.g., large cup coral (<i>Desmophyllum</i> sp.) -soft corals† (Aclyonacea), e.g., mushroom soft coral (<i>Heteropolypus Ritteri</i>), gorgonians (<i>Euplexaura marki</i> , <i>Swiftia beringi</i>) -sea pens† (Pennatulacea) -Humboldt squid (<i>Dosidicus gigas</i>) -feather stars (Crinoidea) -sea stars (Asteroidea), e.g., deep-sea sun star (<i>Rathbunaster californicus</i>) - sea cucumbers (Holothuroidea) (Stierhoff et al. 2011)
Fishes	-California Skate (<i>Raja inornata</i>) -California Headlightfish (<i>Diaphus theta</i>) -rockfishes (<i>Sebastes</i> spp.), e.g., Bank, Aurora, Blackgill -Shortspine Thornyhead (<i>Sebastolobus alascanus</i>) -Sablefish (<i>Anoplopoma fimbria</i>) -Dover Sole (<i>Microstomus pacificus</i>) (Stierhoff et al. 2011)
Marine birds	-Northern Fulmar (<i>Fulmarus glacialis</i>) -Black-legged Kittiwake (<i>Rissa tridactyla</i>) -Cassin's Auklet ³ (<i>Ptychoramphus aleuticus</i>) -Rhinoceros Auklet (<i>Cerorhina monocerata</i>) (Ainley et al. 2012)
Marine mammals	-blue whale ¹ (<i>Balaenoptera musculus</i>) -dolphins (Odontoceti), e.g., Northern right-whale dolphin (<i>Lissodelphis borealis</i>), Risso's dolphin (<i>Grampus griseus</i>), Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>), Dall's porpoise (<i>Phocoenoides dalli</i>) -harbor seal (<i>Phoca vitulina</i>) -Northern fur seal (<i>Callorhinus ursinus</i>) -Stellar sea lion ² (<i>Eumetopias jubatus</i>) (NOAA, 2003)
Marine reptiles	-leatherback sea turtle ¹ (<i>Dermochelys coriacea</i>) (NOAA, 2003)

Special Status Species: Endangered¹, Threatened², Birds of Conservation Concern³;
Biogenic habitat†

Diverse or productive communities:

- low primary productivity
- low krill production
- marine mammal high diversity

Migration, breeding, or foraging areas:

- 100% in leatherback sea turtle NMFS critical habitat

Research

SIMoN projects:

CSCAPE: Collaborative Survey of Cetacean Abundance and the Pelagic Ecosystem (2005-07)

<http://sanctuarysimon.org/projects/100273/cscape%3a--collaborative-survey-of-cetacean-abundance-and-the-pelagic-ecosystem>.

Monitoring whales by Cascadia Research Collective (1991-current)

<http://sanctuarymonitoring.org/projects/100152/monitoring-whales-by-cascadia-research-collective>

Sea Turtle Restoration Project: Leatherback Watch Program (2010-current)

<http://sanctuarymonitoring.org/projects/100395/sea-turtle-restoration-project%3a-leatherback-watch-program->

Structure of Populations, Levels of Abundance and Status of Humpbacks (SPLASH) (2004-current)

<http://sanctuarymonitoring.org/projects/100224/structure-of-populations%2c-levels-of-abundance-and-status-of-humpbacks-%28splash%29>

Tagging of Pacific Predators (TOPP) (2000-current)

<http://sanctuarymonitoring.org/projects/100137/tagging-of-pacific-predators-%28topp%29>

Tracking Black-footed Albatross Movements and Conservation (2004-08)

<http://sanctuarysimon.org/projects/100305/tracking-black-footed-albatross-movements-and-conservation>

Underwater Behavior of Large Whales Using Suction-cup Attached Tags (2000-current)

<http://sanctuarymonitoring.org/projects/100153/underwater-behavior-of-large-whales-using-suction-cup-attached-tags>

usSEABED: A USGS Pacific Coast Offshore Surficial Sediment Data and Mapping Project (2005-current)

<http://sanctuarymonitoring.org/projects/100247/usseabed%3a-a-usgs-pacific-coast-offshore-surficial-sediment-data-and-mapping-project>

Monitoring stations and/or data collection instruments:

- NMFS West Coast Bottom Trawl Groundfish Survey

MBNMS research: None

Science Needs & Research Questions

Habitat Characterization of the Continental Slope

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_characterization_slope.pdf

- What are the distribution and abundance of organisms and habitats on the continental slope?
- How do corals and chemosynthetic communities on the continental slope provide biogenic habitat for other species?

Human Health - Harmful Algal Blooms

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_habs.pdf

- How do HABs affect local species populations?

Impacts on Whales from Human Uses

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_whale_science.pdf

- What are the spatial and temporal patterns of habitat use of large whales throughout sanctuary waters (both inshore and offshore)?
- What are the environmental and prey characteristics that lead to foraging aggregations that may leave whales vulnerable to disturbance by recreational ocean users?

Socioeconomics and the Human Dimension

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_socioeconomics.pdf

- How do we determine the overall impact of multiple human activities (some with negative and some with positive influence) on Sanctuary resources?

SESAs Interactive Map: <http://sanctuarysimon.org/maps/sesa>

Publically Available Imagery: None

SESA Data Layers

Table 2. The 13 SESAs of the MBNMS are comprised of a variety of biological and environmental characteristics that describe unique pelagic and benthic deep sea communities. Listed are a subset of these qualities which include habitat diversity (Shannon-Wiener diversity index); hard substrate area coverage (%); the most common type of habitat; the presence and abundances of corals and sponges, demersal fishes, and marine birds; and the area coverage (%) of upwelling zone within each SESA. Sources: Draft MBNMS report in preparation; SESAs Interactive Map, <http://sanctuarymonitoring.org/maps/sesa/>.

SESA	Habitat diversity (H')	Hard substrate (%)	Primary habitat	Corals & sponges	Demersal fishes	Marine birds	Upwelling zone (%)
4	5.43	8%	Slope 2 soft canyon	yes-high	yes-high	yes-high	yes-50%
5	6.13	19%	Slope 1 Soft Canyon	yes- high	yes-med	yes-med	yes-100%
6	6.62	13%	Shelf Break soft	yes-high	yes-low	yes-med	no
7	3.52	9%	Slope 2 soft canyon	yes-med	yes-high	yes-med	no
8	5.32	33%	Slope 2 soft canyon	yes-med	yes-med	yes-high	no
9	2.34	5%	Slope 2 soft canyon	yes-high	yes-high	yes-low	no
10	3.23	1%	Rise soft canyon	yes-med	not sampled	yes-low	no
11	1.56	16%	Slope 2 soft	yes-med	yes-high	yes-low	no
12	4.17	32%	Shelf hard	yes-med	yes-high	yes-med	yes-50%
13	2.00	0%	Slope 2 soft	yes-low	not sampled	yes-low	no
14	2.41	0%	Slope 1 Soft	yes-med	yes-high	yes-med	yes-50%
15	5.31	18%	Shelf Break soft	yes-med	yes-med	yes-med	yes-25%
16	3.12	73%	Slope 2 hard	yes-high	yes-high	yes-low	no

Selected Publications

Ainley D, Spear L, Casey J, Ford RG, Gill T, et al. 2012. Chapter 3: Biogeography of Marine Birds. A Biogeographic Assessment off North/Central California. Retrieved from Center for Coastal Monitoring and Assessment (NCCOS), National Ocean Service. Available at: <http://ccma.nos.noaa.gov/ecosystems/sanctuaries/california/html/birds/>

Benson SR, Forney KA, Harvey JT, Carretta JV, Dutton PH. 2007. Abundance, Distribution, and Habitat of Leatherback Turtles (*Dermochelys coriacea*) Off California, 1990– 2003. *Fishery Bulletin*, 105(3): 337-347. Available at: http://aquaticcommons.org/8876/1/benson_Fish_Bull_2007.pdf
<http://montereybay.noaa.gov/research/techreports/trbenson2007.html>.

Brown JA, EJ Burton, S De Beukelaer. 2013. The Natural Resources of Monterey Bay National Marine Sanctuary: A Focus on Federal Waters. Marine Sanctuaries Conservation Series ONMS-13-05. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 264 pp. Available at: <http://montereybay.noaa.gov/research/techreports/trbrown2013.html>

Greene HG, Maher NM, Paull CK. 2002. Physiography of the Monterey Bay National Marine Sanctuary and Implications About Continental Margin Development. *Marine Geology*, 181(1-3): 55-82.

Hall RA, Glenn SC. 2011. Internal Tides in Monterey Submarine Canyon. *Journal of Physical Oceanography*, 41(1): 186-204.

NOAA National Centers for Coastal Ocean Science (NCCOS). 2003. A Biogeographic Assessment off North/Central California: To Support the Joint Management Plan Review for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries: Phase I - Marine Fishes, Birds and Mammals. Prepared by NCCOS's Biogeography Team in cooperation with the National Marine Sanctuary Program. Silver Spring, MD 145 pp.

Stierhoff KL, Etnoyer PJ, Murfin DW, Butler JL. 2011. A Survey of Deep-water Coral and Sponge Habitats Along the West Coast of the US Using a Remotely Operated Vehicle: NOAA Fisheries Survey Vessel (FSV)'Bell M. Shimada', November 1-5, 2010. NOAA Technical Memorandum NOS NCCOS 138: 37pp. Available at: <http://montereybay.noaa.gov/research/techreports/trstierhoff2011.html>